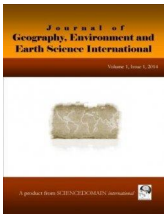

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A Survey of the Exploitation of Medicinal Plants: Gashaka-Gumti National Park, Taraba State in Perspective

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Authors' contributions

This work was carried out in collaboration between all authors. Author EDO designed the study, performed the statistical analysis, wrote the protocol and wrote the first draft of the manuscript. Authors VNO and YMA managed the analyses of the study. Author DM managed the literature searches. All authors read and approved the final manuscript.

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ABSTRACT

This study appraised the uses of some indigenous medicinal plants in Gashaka Gumti National Park and the methods used in exploiting and processing the plants. Data for the study were collected through field observation, interview, and structured questionnaire. A hundred and five (105) structured questionnaires were administered to local communities around the park. Data collected were analyzed using descriptive statistics. The findings of the study reveal that there are about 35 families of medicinal plants species found in the Park and the majority of them are reported to be wild. There has been little effort to document these plant species. The findings also show that the bark, leaf, seed, root, and stem of medicinal plants are used for different purposes. The methods of processing these parts of the medicinal plants are boiling, soaking in water and pounding depending on the type of ailment or disease.

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1. INTRODUCTION

Medicinal plants are those plants whose parts such as roots, leaves, seeds, and barks are used for therapeutic, tonic, purgative, or other health-promoting purposes [1]. Medicinal plants are used in treating and preventing specific ailment and diseases that are generally considered harmful to humans [2].

Medicinal plants are important sources for pharmaceutical manufacturing. Plants are important in our everyday existence. They provide our foods, produce the oxygen we breathe and serve as raw materials for many individual products such as raw materials for many industrial products such as clothes, footwears, and so many others. They also provide raw materials for our buildings and in the manufacturing of biofuel, dyes, perfumer, pesticides adsorbent and drugs (medicine).

Medicinal plants have been used virtually in all cultures as a source of medicine since time immemorial. The widespread use of herbal remedies and healthcare preparations, as those described in ancient texts such as the Vedas and the Bible (Ezekiel 47:12) and obtained from commonly used traditional herbs and medicinal plants, has been traced to the occurrence of natural products with medicinal properties. The medicinal plant has similar properties as conventional pharmaceutical drugs. Human has used them throughout history to either cure or lessen symptoms from an illness. Often times, these primitive attempts of medicines were based on superstition and speculation. Today, the World Health Organization (WHO) estimate that 80% of the population in developing world still uses traditional remedies, including plants as their primary healthcare tools [3]. According to Schippman [4], more than 50,000 plant species are used for medicinal purpose worldwide, of which almost 13% are flowering plants. Medicinal plants containing active chemical constituents (alkaloid, glycoside, saponin, essential oil, better principle, tannins and mucilages) in their parts for example, roots, stems, barks, leaves, fruits and seeds which produce a definite curing physiological response in the treatment of various ailments in human and other animals [5].

In different civilisations, the contribution of floral biodiversity to health care has been well documented [6]. Because of development in local, national and international interest in recent years, the demand for medicinal and aromatic plants has increased manifolds and pharmaceutical industry views plant wealth as a source of income. Due to easy availability and sometimes only source of health care, the demand for medical plants is increasing in both developing and developed countries. Plants in all facet of life have served a valuable starting material for drugs development [7]. Many of these indigenous medicinal plants are used as species and food meant for pregnant mothers for medicinal purposes [8]. One of the primary objectives of establishing, managing and maintaining national parks is for the conservation of wildlife and as a source of revenue through ecotourism based activities. According to Ayodele [9], the national parks, game reserves, forest reserves and wildlife sanctuaries are meant to protect endangered species, promote sustainable harvest, conservation education, promote ecotourism and benefit the host community.

Nigeria is rich in both flora and fauna which form an important center of biodiversity of tropical rainforest, coastal plains, mangrove and the savannah zone [10]. But already it lost about 90% of its forest which rated it as having the highest deforestation rate [11]. Similarly, NCF [12,13,14] and [15] stated that about three-quarters of the remaining flora and fauna species are threatened and many of these are being endangered due to some anthropogenic activities and natural occurrences. The major threat to the availability of medicinal plants is deforestation. The rural dwellers are the major contributor to biodiversity depletion due to their farming and other illegal activities [16]. Therefore, [17] advised that an effort should be made to conserve the diversity of the vital resources.

Despite the rich plant's diversity of Gashaka-Gumti National Park, not much has been done by way of assessing the indigenous medicinal plant potential of the Park. Giving the importance of medicinal plant to the livelihood of the rural dwellers, it is important to examine the indigenous medicinal potential of the Park by identifying the various indigenous medicinal plants available, evaluating the method of harvesting and assessing how the exploited medicinal plants are processed. This research is interested in identifying the indigenous medicinal plants in the area; examine the methods of

exploitation as well as the methods of processing the medicinal plants in Gashaka-Gumti National Park.

2. MATERIALS AND METHODS

2.1 Description of Study Area

Gashaka – Gumti National Park is located in Taraba State, North Eastern Nigeria. It stretches northwards along the international border with the Republic of Cameroon by Mambilla plateau and into Adamawa State as far as the small town of Tongo some 40km south of Ganye. The Park lies between latitude 6°55' and 8°05' North and longitude 11°11' and 12°13' east [18] (Figs. 1 and 2). The vast area occupied by the park is roughly the size of the combined landmass of the Canary Islands [19].

Gashaka-Gumti was declared a National Park in 1991 under National Park decree number 36 of 1991. It derives its name from two of the regions oldest and most historic settlement: Gashaka village in Taraba State and Gumti village in Adamawa State. The park is among the seven National Parks in Nigeria and also the most scenic and biological diversity conservation enclave; it compasses savanna, forest, wetland and methane habitats in a continuous ecological transition [20].

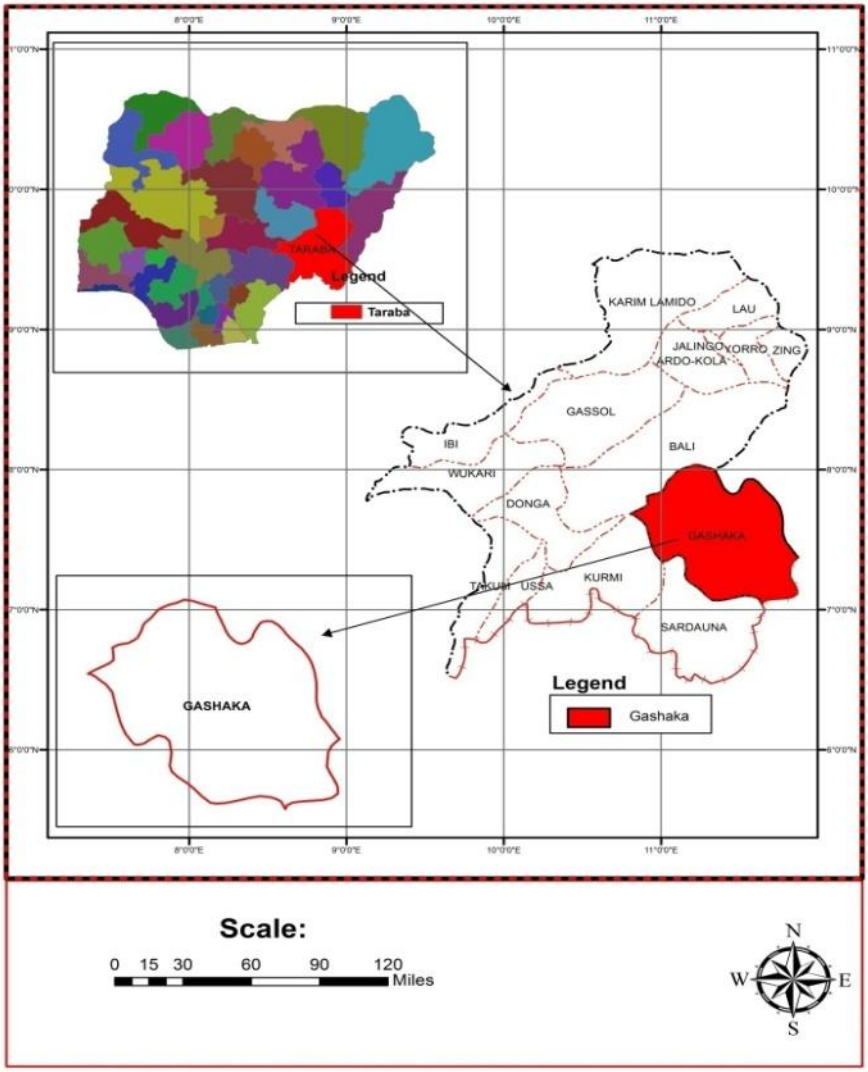

Fig. 1. Location map Gashaka

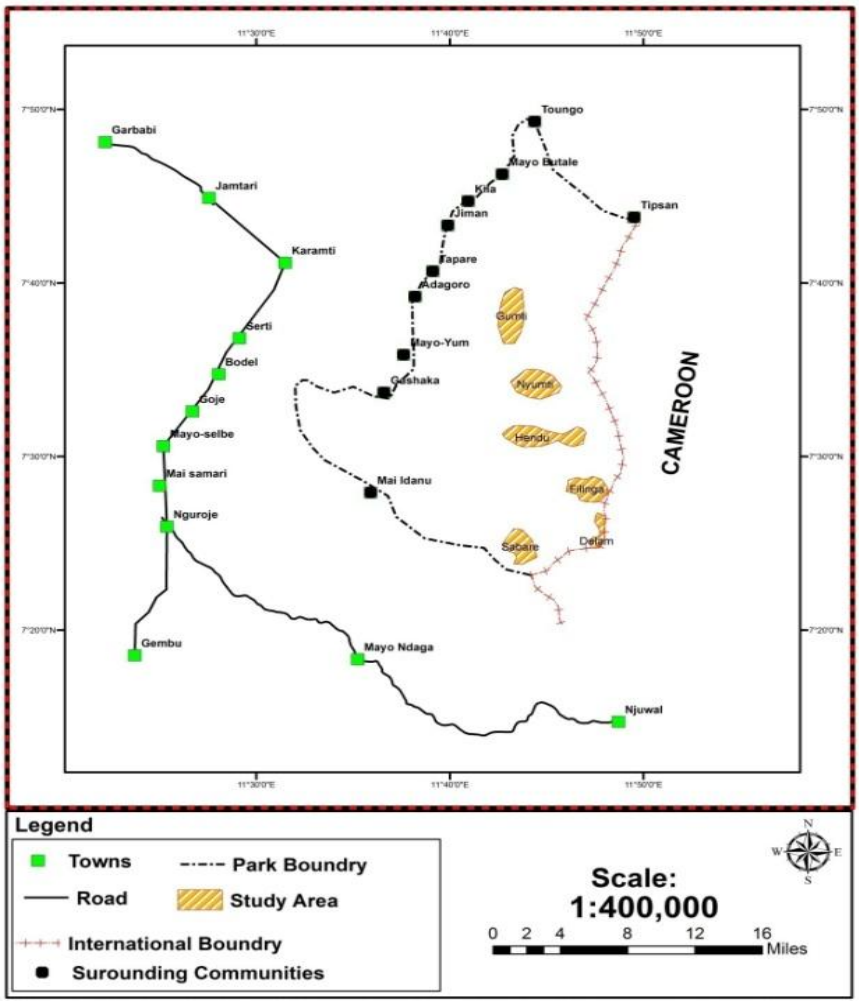

Fig. 2. Map of Gashaka Gumti showing study area

The National Park derived its name from the amalgamation of Gashaka game reserve in Taraba state and Gumti game reserve in Adamawa state. It is the largest National Park in Nigeria with a total land mass of 6731km^2 with an undulating terrain and deep rolling valley. It is the only National Park in Nigeria that has an ecological transition zone from Savannah to rainforest and mountain ecosystem. The park has the highest mountain peak in Nigeria which is called the Chappal Wadi also known as Gangirwa (mountain of death) with a height of about 2400m above sea level [20].

There is gradual transition from wetter areas in the south of the park, characterized by rainforests and mountains; to drier lowland areas in the North of the Park which characteristically are only able to support Savannah – like vegetation. At the beginning of the dry season and at higher altitudes, the weather is cold. Although daytime temperatures may reach 40°C in the shade in March, they may equally drop to below 5°C at higher altitude in December. Sudden storm and hailstone are common on the mountain of Gangiwal [20]. Rainfall does not fall evenly throughout the year; there is typically a wet season comprising that Month when there is a lot of rainfall and many rainy days and a ‘’dry season’’ when little or no rains fall and there are few, if any, rainy days. The high Mountain ranges in the area act to trap rain cloud blowing in off the Atlantic Ocean, thus ensuring abundant rainfall sufficient to support large patches of rainforest in parts of the Park sector. Lowland rainforest also thrives along the Park’s many rivers valley, where they are more correctly know as gallery forest [20].

2.2 Method of Data Collection

The survey design study utilized both primary and secondary data. Primary data on "exploitation of the indigenous medicinal plants in Gashaka-Gumti National Park" was collected through the administration of 105 structured questionnaires which were distributed among different respondents in the study area using simple random sampling method. Field observation was also carried out during which some of the medicinal plants were seen as they were harvested and processed into different medicinal formulations such as fluid and powder by the local communities. The data collected was analyzed using descriptive statistics and presented in tables and figures.

3. RESULTS AND DISCUSSION

Table 1 shows the demographic characteristics of the respondents. The factors presented are sex, age, marital status, educational qualification and occupation of respondents. The Table shows that, 56% are male and 44% female. This difference is mainly due to the technicality involved in identifying and processing the medicinal plants. In terms of age, 9% of the respondents were below 30 years, 20% between 30-39 years, 33% 40-49 years and 37% are from 50 years and above. The high number of respondent within the range of 40–49 years and 50 years and above is because of the fact that the processing and administering of herbal medicine is best handle by older people with more knowledge and experience in medicinal plants. The marital status shows that 10% of the respondents are single, 45% are married, 25% are divorced and 20% are widowed. Table 1 also shows that, 35% of the respondents are farmers, 20% are Hunters/fishermen, 15% are herdsmen, and 18% are herbalist/traditional medicine practitioners while 11% engage in other forms of occupation such as workers and researchers in the Park.

Findings of study shows that there are indigenous medicinal plants in the National Park and these were identified by the respondents through knowledge and experiences acquired. This knowledge and experiences are acquired in various ways as shown in Table 3.

Table 3 reveals that 58.1% of the respondents inherited the knowledge and experience to identify indigenous medicinal plants from their parents or grandparents, while 7.6% of the respondents claimed that they learnt to identify medicinal plants in the area by inspiration.

The other 29.5% of the respondents which comprises of both some members of the local community and researchers (resident and visiting) in the Park claimed that they were taught on how to identify medicinal plants during their study and through enquiry.

Finding of the study also revealed that majority of the identified indigenous plant species are wild, while few are cultivated. There are more than 30 families of the indigenous medicinal plant species reported to be used in the treatment of various human ailments in the study area. They are used in treating such ailment as Fever, Stomach offset, Typhoid, Pile, Cough, Diarrhea, Gonorrhea, Asthma, Rheumatism, Chicken pox etc in the study area.

Table 1. Demographic characteristic of respondents

Sex	No. of respondents	Percentage (%)
Male	59	56
Female	46	44
Total	**105**	**100**
Age		
29 below	9	9
30 – 39	22	21
40 – 49	35	33
50 – above	39	37
Total	**105**	**100**
Marital Status		
Single	11	10
Married	47	45
Divorced	26	25
Widowed	21	20
Total	**105**	**100**
Educational Qualification		
Informal Education	22	21
Primary Education	41	39
Secondary Education	33	31
Tertiary Education	6	6
Others	3	3
Total	**105**	**100**
Occupation		
Farming	37	35
Hunting/ Fishing	21	20
Herdsmen	16	15
Herbalist/traditionalist	19	18
Others	12	11
Total	**105**	**100**

Source: Fieldwork, 2016

Table 2. Some Indigenous medicinal plants found in GGN Park and their uses

Scientific name	English name	Local name	Part used	Medicinal uses
Acacia sieberiana	White thorn		Leaf	Typhoid fever, Pile and Body pain
Adansonia digitate	Baobab	*Kuka*	Leaf	Diabetes, cough, asthma, pile and stomach issues.
Afzelia Africana	African oak	*Kawo*	Bark	Cough
Allium sativum		*Tararnuwa*	Stem bulb	Catarrh, cough
Annona senegalensis	Wild custard apple	*Gwadan daji*	Root, juice, leaf	Cure fresh wound, diarrhea, venereal diseases
Anogeissuss,leiocapus	African birch	*Marke*	Stem-bark	Blood tonic, Stomach trouble, cough, diarrhea
Bombax costatum	Red kapok	*Kurya*		Pile, yellow fever, headaches
Boswelia dalzielli	Frankincense tree	*Hano*	Leaf	Yellow fever
Burkea Africana		*Baki makaho*	Bark	Old wound
Cussonia arborea		*Gwabsa*	Root	Fever
Entada Africana		*Tawatsa*	Bark	Cough
Erythrophleum suaveolens	Ordeal tree	*Gwaska*	Stem/back	Chicken pox
Erythrina senegalensis	Coral tree	*Majiriya,*	Leaf	Fever
Ficus sp	Sandpaper tree	*Baure*	Bark, latex	Ring worm, increases breast milk
Ficus thonningii		*Chediya*	Leaf	Stomach offset, chicken pox
Moringa Oleifera	Never die, horse-radish tree	*Zogole*	Leaf, root	Asthma, rheumatism, arthritis, ulcer
Parkia biglobosa	African locust bean tree	*Dorawa*	Stem, bark	Chicken pox, Measles
Prosopis Africana	Ironwood	*Kirya*	Stem/pod	Pile, cough
Pterocarpus erinaceus	Rosewood tree	*Madobia*	Bark	Blood tonic
Terminalia schimperiana		*Baushe*	Bark	Cough
Vernonia colorata	Bitter leaf	*Shuwaka*	Leaf	Stomach pain Pile, rheumatism
Vitellaria paradoxa	Shea butter tree	*Kadanya*	Latex from seed	For dislocation
Securidaca longepedonculata	Violet tree	*Uwar magunguna*		Fever, blood tonic, Arthritis, Bone marrow, Stomach uses
Vitex doniana	Black plum	*Dinya*	Leaf, Bark	Blood tonic, jaundice, male fertility
Desmodium velutinum		*Kimba mahalba*		Preservatives stomach

Source: Fieldwork 2016

Table 3. Method of acquiring knowledge of identification of medicinal plants in the park

Methods of acquisition of knowledge	Respondents	Percentage
Inherited	61	58.1
Inspired	8	7.6
Learnt	31	29.5
Total	105	100

Source: Fieldwork 2016

Plate 1a. *Acacia sieberiana*

Plate 1b. *Prosopis africana*

Plate 2a. *Vitex doniana*

Plate 2b. *Parkia biglobosa*

Plate 3a. *Ficus vollis*

Plate 3b. *Afzelia africana*

Table 4. Method of exploitation/ harvesting medicinal plants in the Park

Exploitation/ Harvesting Approach	Respondents	Percentage
Leaves	9	8
Root	7	7
Bark	7	7
Stem	5	5
Flower	3	3
All of the above	74	70
Total	105	100

Source: Fieldwork 2016

Table 4 shows the methods used to exploit or harvest medicinal plants from the Park. 8% of the respondents harvest the leaves of plants for preparation of medicine, 7% harvest the roots, another 7% use the barks of the plants, 5% use the stem and 3% use the flowers. On other hand, 74% of the respondents harvest all of the plants parts described in Table 4. The plants are mostly harvested while they are fresh and may be dried. Findings from the respondents show that fresh plants are more effective in medicinal preparations.

Table 5. Methods of processing medicinal plants

Processing approach	Respondents	Percentage
Boiled	54	51.4
Soaked	19	18.1
Pounded	21	20
Others	11	10.5
Total	**105**	**100**

Source: Fieldwork 2016

Table 5 shows the methods used in processing medicinal plants in the study area. From the Table it can be seen that 51.4% of the respondents process the plant for medicine by boiling, 18.1% processed it by soaking it in water for a period of time, 20% pound the plant part(s) and 10.5% consist mainly of chewing and rubbing. The method employed at any time depends on the nature of the ailment and the type(s) of plants used. These medicinal plants are prepared in local ways that are not standardized. The preparation is also determined by the type of plant used and condition being treated. When the local communities were asked why the used plants for traditional medicine in the area, many of them claimed that it is very cheaper in terms of cost, readily available at any time it is required and more importantly meets their basic health needs. Findings from the study show that the local communities do not exploit the indigenous plants for sales or commercial purpose.

Gashaka Local Government Area (LGA) where the Park is located has a General hospital and 38 primary health care facilities spread out across the political wards. The LGA has 30 nurses/midwives, 3 doctors, 2 pharmacists, 5 laboratory technologists with 151 hospital beds capacity in 2010 [21]. This cannot be said to be adequate for an LGA with a population of 87,781 (48,911 males and 38,870 females) according to the 2006 national census. Thus, given the low level of education in the area, the shortage of health care personnel, high cost of modern medicine and poor funding of health care services in Nigeria, the local communities resort to making maximum use of traditional indigenous medicinal plants in meeting their basic health needs. This is more so as the medicinal plants are within their reach in abundance. Despite the restrictions by Park authorities, the surrounding enclave communities harvest these plants with little or no regards to existing Park regulations. They claimed that the Park and its plant contents is their heritage and so should not be denied access to harvesting the medicinal plants that are readily found in their community. Most of them claimed that they cannot afford to go to hospitals or buy conventional drugs when they are sick. This leaves them with no option than the local medicinal herbs.

4. CONCLUSION

This study has examined medicinal plants in Gashaka Gumti National Park. The study identified some of the medicinal plants in the Park, the method of its exploitation and processing. The findings of the study show that there are several medicinal plants used in treating different ailment and diseases among the rural dwellers in the study area. The reasons given for the reliance on the medicinal herbs by the local communities is that it is cheaper, available and effective in meeting their health needs. The study also revealed that the local method of preparing the medicinal plants include cooking, soaking in water and pounding into powder. The documentation of the indigenous knowledge of the use and importance of the medicinal plants is an added value to research which will greatly help to attract more research on the uses in the primary health care system and may help policymakers in the future to

strengthen old or make new legislation that can help in sustainable exploitation on these plants in conserved manners.

5. RECOMMENDATION

Based on the findings of the study, the following recommendations are made:

i. There should be proper documentation and inventory of these medicinal plants in the Park especially for future use.
ii. The management of the Park should include the locals or communities in the research on medicinal plants since they have good knowledge of the medicinal plants and can identify most of them.
iii. The Park authorities should also increase surveillance and improve their check on the collection of medicinal plants in the Park to reduce overexploitation of some important rare plant species.
iv. If at all the harvest of these plants is allow, cultivation of new ones should be done or encourage to maintain its availability in the future. The enclave communities are already aware of the term conservation. They only need more enlightenment on the importance of conserving the medicinal plants to their welfare.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. Foster S, Duke JA. A field guide to medicinal plants: Eastern and Central North America. 2nd ed.; 2000.
2. Anselem A. Herbs for Healing Pax Herbals Edo State, Nigeria; 2004.
3. Veeramuthu D. Antibacterial activity of some ethnomedicinal plants used by Paliya Tribe from Tamil Nadu India; 2006.
4. Schippman U, Leman DJ, Cunningham AB. Impact of Cultivation and Gathering of Medicinal Plants on Biodiversity; 2002.
5. Adhikari BS, Babu MM, Saklani PL, Rawat GS. Medicinal plants diversity and their Conservation Status in Wildlife Institute of India (II) Campus, Dehradun. Ethnobotanical Leaflets. 2010;14:46-83.
6. Posey DA. The Impact of Forest Degradation on Medicinal Plants; 1999.
7. Ajibesin KK. *Dacryodes edulis* (G. Don) H.J. Lam: A review on its medicinal, phytochemical and economical properties. Research Journal of Medicinal Plants. 2011;5:32-41.
8. Akinpelu DA, Onakoya ZT. Antimicrobial activities of medicinal plants used in folklore remedies in South-western Nigeria. African Journal of Biotechnology. 2006;5: 1078-1081.
9. Ayodele IA, Abe AJ, Olaniyan AO. Essential of Zoo management. Jachim publishers, Ibadan, Oyo State, Nigeria. 1999;1-34.
10. Alabo TG. A keynote address; on the preservation of Land, Cultural and wildlife for the development of ecotourism at University of Ibadan, Oyo State, Nigeria; 2008.
11. Centre for Education, Research and Conservation of Primates and Nature (CERCOPAN) Annual Report. 2011;2–10. Available:www.cercopan,org
12. Nigerian Conservation Foundation (NCF). Protected gazetted and proposed in Nigerian Conservation Foundation Report; 2002.
13. Babagana G, Mohammed MA, Garba M. Environmental impact of natural resources exploitation in Nigeria and the way forward. Journal of Applied Technology in Environmental Sanitation. 2012;2(2):95-102.
14. Ahmed RK. Biodiversity loss: A threat to urban landscape. International Research Journal of Arts and Social Sciences. 2013; 2(6):144-149.
15. Ibimilua AF. Biodiversity-ecosystem management and sustainable development in Ekiti State, Nigeria. British Journal of Humanities and Social Sciences. 2013; 9(1):35–45.
16. Nathaniel IT, Nathaniel A. The effect of poverty in conservation of biodiversity; The Nigerian's Experience; 2001.
17. Haile Y, Delenasaw Y. Traditional medicinal plants knowledge and uses by local Healer in Sekou District Jimma Zone Ethopia. Journal of Ethnobiology and Ethnomedicine. 2007;3:24.1-7. Available:https://doi.org/10.1186/1746-4269-3-24
18. Mubi AM, Tukur AL. Geology and Relief. In Tukur, AL, Adebayo AA, Galtima A. (Eds.). The Land and People of the Mambilla

Plateau. Nigeria: Heinemann Educational Books. 2005;16-24.
19. Sommer VC, Ross C, Eds. Primates of Gashaka, Developments in Primatology: Progress and Prospects. 2011;35. DOI: 10.1007/978-1-4419-7403-7_1
20. Dunn A. Gashaka-Gumti National Park, a Management Plan for Developing the Park and Support Zone. 1999;1-224.
21. Oruonye ED, Abbas Bashir. The Geography of Taraba State, Nigeria. Fab Educational Books; 2011.

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